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November 30, 2004

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Mr. Nabil Fayoumi  
Work Assignment Manager (SR-6J)  
U.S. Environmental Protection Agency  
77 West Jackson Boulevard  
Chicago, IL 60604-3590

Subject: Meeting Summary: Groundwater Migration Control System (GMCS) Status  
Meeting - November 16, 2004  
Sauget Area 2, Site R, Sauget, Illinois  
WA No. 224-RXBF-05XX, Contract No. 68-W6-0025

Dear Nabil:

Enclosed please find two copies of the document referenced above for the Sauget Area 2, Site R, in Sauget, Illinois.

The document provides notes from the meeting on November 16, 2004 between the Solutia, USEPA (Superfund and RCRA Divisions), IEPA, and their contractors in which the GMCS Status Report and subsequent path forward were discussed.

If you have any questions about these documents, please do not hesitate to call me at (314) 421-0313 ext. 221.

Sincerely,

CH2M HILL

*Cherie Wilson*

*for*

Christopher E. English, P.E.  
Site Manager

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c: Stephen Nathan, PO/U.S. EPA, Region 5 (w/o enclosure)  
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## Groundwater Migration Control System (GMCS) Status Meeting – November 16, 2004

**ATTENDEES:** Nabil Fayoumi/USEPA-Superfund  
Sandra Bron/IEPA  
Ken Bardo/USEPA-RCRA  
Gary Cygan/USEPA-RCRA  
Clair Morris / CH2M HILL

Andrew Sprinkle/CH2M HILL  
Steve Smith/Solutia  
Bruce Yare/Solutia  
Richard Williams/Richard Williams and Associates

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Jim Schneider/CH2M HILL

**FROM:** CH2M HILL

**DATE:** November 29, 2004

This memorandum summarizes a meeting that took place on November 16, 2004, at Site R, Sauget Area 2 located in the Village of Sauget, Illinois. Representatives of USEPA Superfund Division and RCRA Division, IEPA, and the Solutia were in attendance.

Mr. Steve Smith distributed a meeting agenda. The objectives of the meeting were to discuss the *Status Report, Sauget Area 2 GMCS, Sauget and Cahokia, Illinois* dated November 16, 2004 and the subsequent path forward.

### Overview and History of Pumping Operations

The GMCS system started operation with unrestricted flow (from the American Bottoms Regional Wastewater Treatment Facility (ABRTF)) near the end of 2003, at which time the barrier wall was approximately two-thirds excavated. In December 2003 and January 2004 Solutia tried to operate the system via an algorithm to control the hydraulic head. On February 5, 2004 the system pumped at full capacity until mid-March, subsequently, the no-wall lookup table was utilized to control the pumping flow rate.

Solutia contends that a trough was established along the line of the extraction wells and hence they achieved hydraulic control continuously since February 2004.

Between September 16 and October 10, a maximum system pumping test was repeated. Since this time, the system has been operated by manually adjusting the pumping flow rates following the flow rates set by the lookup table. The goal of the lookup table was to estimate the pumping rate required to intercept all of the groundwater discharging to the river assuming that the wall was not present.

The Site R Barrier Wall was completed on November 8, 2004.

Mr. Fayoumi of USEPA (Superfund) commented that the pump test which occurred between September and October 2004 was to test if the system was capable of maintaining a zero gradient at a time period when the Mississippi River is low. The test was not discussed in the Status Report. Mr. Yare of Solutia responded that the data during this test was of little use because the outside piezometers were recording incorrect elevations (biased low) and because the test was based on a steady state pumping level.

Mr. Yare explained the GMCS system had operated during the barrier wall construction under the control metric as defined in the Focused Feasibility Study (FFS) (URS, 2003). These metrics had required that the piezometers located inside the barrier wall recorded water elevations at a level less than or equal to the river elevation.

## **System Maintenance – Water Level Measurement Improvements**

In September and October 2004 Solutia conducted a full system evaluation and maintenance on the GMCS including all piezometers, transducers, and evaluation of the river elevation data. Note that for ease of reference the piezometers have been renamed to inside or outside at each pair instead of the previously used north, south, east, or west designation.

### **Groundwater Level Measurement**

The checks and maintenance performed on the piezometers and transducers at Site R included:

- Checked the zero reading on all transducers and subsequently rezeroed
- Checked the specific gravity of groundwater in the piezometers – transducer readings utilize the specific gravity of water to calculate the water elevation
- Checked the barometer – transducer readings are normally corrected for atmospheric pressure
- Transducers were raised within the piezometers to a depth equivalent to the elevation of the base of the Mississippi River
- Checked and corrected the accuracy of all transducers to the manual readings

A ½ to 1½-foot difference in the transducer readings at the piezometers to the manual measurements with a water-level indicator was discovered. In piezometers P1-inside [P-1(I)] and P1-outside [P-1(O)] slurry was found at a depth approximately 10 to 15 feet below the static water table. However, the slurry was found to not affect the quality of the water levels in these two piezometers. Following all maintenance, the transducers are recording water levels within a 0.2-foot error of the manual readings. Solutia believes this level of accuracy is likely as good as could be optimally achieved.

In order to improve the whole system, Solutia has ordered replacement transducers with 0-25 pounds per square inch (psi) range capability and HDPE cables. These transducers will be more accurate and robust. The new transducers will likely be installed within two weeks. Mr. Yare commented that the transducers at the P4 piezometer location utilize lead

wires that are up to 1500 feet in length to convey the signal to the control building. The new transducers will improve the signal loss for this pair. Solutia also plans to conduct weekly manual water level measurements in each piezometer to check the transducers for drift from accurate readings in the future.

## **Surface Water Level Measurement / River Gauge**

Currently, the GMCS receives the river elevation via a bubbler gauge operated and maintained by American Bottoms. The bubbler gauge is located on the north of Site R adjacent to the ABRTF outfall. Mr. Yare commented that a difference of up to 5 feet in river elevation has been observed between the American Bottoms gauge and the United States Army Corps of Engineers (USACE) gauge located at the Eads Bridge approximately 1 mile upriver from Site R. In the past when the river has rapidly fallen the bubbler gauge did not respond to the change. On October 20, 2004, the American Bottoms bubbler gauge recorded an average river elevation 2.1 feet lower than the USACE Eads bridge gauge.

Solutia is not comfortable with relying on the American Bottoms gauge as they have no control over the maintenance of this gauge. Mr. Yare stated the USACE Eads Bridge gauge is well maintained and more reliable so they would prefer to use data supplied from this gauge for the river elevation.

Mr. Yare explained the drop in river elevation between the USACE gauge at the Eads Bridge and a second USACE manual location for river gauging located ½ mile to the south of Site R is 0.2 feet. Thus, Solutia contends that as the drop in river elevation between the Eads bridge and Site R is negligible the Eads bridge gauge is an appropriate feed to use to supply the river elevation to the GMCS. Ms. Bron questioned whether a constant correction factor to the river elevation may be required if the river data is supplied from the Eads bridge gauge.

Solutia has had preliminary discussions with the USACE, and will meet with them this week to discuss whether an electronic feed from the Eads Bridge gauge could be tied into the GMCS.

## **Future Control of System, 90-day Trial**

Solutia explained that 'good data' are required to set up long term automatic control of the GMCS.

Mr. Yare stated the data collected after September 21, 2004 is not usable to base the future pumping flow rates upon because (1) the barrier wall was not complete until November 8, and (2) system maintenance was occurring during this time frame. Solutia stated there exists approximately 90 days of usable data collected between June and September 2004, when the barrier wall was between 60 to 100 percent excavated. This data was used as a basis for GSI to develop the algorithm to control the pumping flow rate of the GMCS in the future. There is a good match between the no-wall lookup table pumping flow rates and the new algorithm.

However, Solutia contends there is insufficient data on how the system will respond following the completion of the barrier wall and the transducer and system maintenance.

They proposed a 90-day trial of the new algorithm, during which more quality data will be collected. Solutia plans to adjust the algorithm on a weekly basis to control the pump rate during this period to fine tune the control system so it can operate automatically in the future. It is also anticipated that all kinks in the system, such as the river gauge issues, will be resolved during this time period.

Ms. Bron questioned the performance monitoring of the GMCS. Mr. Smith stated the new algorithm will operate based on the median of the water levels in (1) all outside piezometers and (2) all inside piezometers to determine the gradient across the barrier wall. Solutia contends that looking at the median inside and outside the barrier wall is a functional equivalent to the current Record of Decision (ROD) performance language.

Mr. Williams stated that the extraction wells cannot be controlled by looking at each individual piezometer pair because you end up with circular logic to control the flow rates. In order to develop a predictive equation to control the GMCS flow rates you need to use the median of the inside and outside piezometer water levels.

Ms. Bron questioned how the algorithm is performance monitoring. Mr. Yare stated the system is being shown to pump out what is flowing into the U-shaped barrier wall. Mr. Smith said that if the median of the inside piezometers is less than or equal to the median of the outside piezometers then it proves the GMCS is capturing the groundwater flowing into the U. Or in other words, as long as the water level in the inside piezometers is lower, it shows that any groundwater flowing into the U is moving toward the extraction wells. Thus, this performance metric achieves the RCRA-based trough requirement (extending between the three extraction wells).

Mr. Yare explained the medians in the inside piezometers, P1 and P4 group (i.e. along the north and south wings of the barrier wall U) and the P2 and P3 group (i.e. along the main north-south alignment of the barrier wall) are available with reasonably good data from June to September 2004. The medians for the outside piezometers during this time frame were more varied but are still appropriate for measuring.

Mr. Fayoumi stated that during the 90-day test period Solutia should still continue to collect data from each piezometer. Solutia stated that all data currently collected would continue to be collected; however, the weekly deliverables to EPA would consist only of the tabulated data without the potentiometric surface maps.

Ms. Bron stated that the approach assumes that Solutia will obtain agency concurrence. Mr. Yare responded that Solutia cannot do it another way as they do not know how to control the system other than in the suggested manner.

Mr. Yare explained there is a penalty associated with the gradients at the P2 and P3 piezometers pairs merely due to the steep gradient to the river in these locations. In this area, there is approximately a ½-foot natural gradient drop over the 30-foot space between the piezometer located inside and outside the wall because of the close proximity to the river. This is not the case for the P1 and P4 piezometer pairs. The P2 and P3 piezometer pairs were installed to demonstrate the physical stability or integrity of the wall. Mr. Yare explained the wings of the barrier wall are extremely important to reduce the influence of the river. Water levels in the P2 and P3 group have been observed to have different influences to those at the P1 and P4 piezometer groups. CH2M HILL questioned if this was

the reason why the middle extraction well, EW-2, was now pumping at a higher flow rate to the two end (EW-1 and EW-3) extraction wells. Mr. Williams explained that the middle extraction well had been pumping at 40 percent of total pumped volume for approximately two weeks. This modification to the GMCS was designed to create a greater influence on the water levels at the P2 and P3 piezometer locations.

Mr. Yare explained that even if the extraction well pumps were to shut down temporarily the barrier wall still captures the groundwater flowing into the U. The river has been shown to influence the aquifer up to one mile inland – influences have been observed at the Krummrich facility.

Solutia's intent is to make a technical argument based on the median as a functional equivalent to the ROD language. They will collect data for 90 days, during which they hope to see at least one quick drop in the river level so they can observe the response time and see how quickly the GMCS will adjust. Solutia plans to submit a report at the end of March based on the data collected during the 90-day evaluation period.

Ms. Bron questioned if during the evaluation period the GMCS could be checked against the performance metrics as delineated in the FFS (i.e. inside piezometer water levels less than or equal to the river level). Solutia responded that they cannot control the GMCS based on the river if they aim to refine the algorithm, they need to move control to a ROD-based performance metric (gradient across the barrier wall). Mr. Fayoumi requested that the data still be collected to do the evaluation between the inside piezometers and the river. Mr. Yare stated that there is a two to three-foot drop in elevation from the outside piezometers and the river elevation, if the comparison is made between the inside piezometers and the river then the GMCS is over-pumping. Mr. Smith stated that if the outside piezometers show water levels greater than or equal to the inside piezometers then Solutia have demonstrated they have control of the aquifer.

Ms. Bron questioned if Solutia's approach over the next 90 days was how they planned on permanently operating the GMCS in the future. Mr. Smith questioned that if 3 of 4 piezometer pairs met the performance metrics in the ROD, but one piezometer pair showed a water level higher in the inside piezometer – would this scenario be considered non-compliance? Ms. Bron responded yes.

## Upcoming Schedule

Solutia plans on conducting the first round of groundwater quality monitoring in February or March 2005. The monitoring will consist of sediment and surface water sampling in the Mississippi River, and sampling in the three groundwater monitoring well clusters located outside the barrier wall at Site R.